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COST OF MILK PRODUCTION

by

NOEL ARDIS NEGLEY

A Thesis Submitted for the Degree of

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The Cost of Milk Production

There is little difficulty in securing a good attendance of farmers at a meeting to raise the price of milk, but it is more difficult to create interest in the adoption of practices which result in lowering the cost of producing milk. However, when the dairymen see that without giving the consumer sufficient educational preparation as to the value of milk as a food,an increase in price always results in a decrease in consumption, they will realize both the necessity for advertising their product and for affecting economies in production, rather than giving all their attention to price raising.

Most investigations into the costs of milk production have been for the purpose of securing information upon which the price of the product may be made. But the price of milk cannot be based upon the cost of production, first, because the cost cannot be definitely determined, second, because the consumer who determines the price by deciding if he will drink milk or not at a certain price is not particularly interested in the cost of production, and, thirdly, because milk being a very perishable product and in this section not easily marketed in other forms the price is very responsive to the supply and the demand. The object of this investigation was not to justify or condemn any fixed price of milk but to find out what practices were best adapted to the section and how greater efficiency in production might be secured.

The dairymen in the market milk sections while learning the advantages of collective bargaining are also learning that they cannot sell more milk than the consumer will buy, and that in setting a price for milk there are many other things to consider besides the cost of production, important though that consideration may be. During the past couple years there has been cooperative bargaining by the Chicago Market Milk Section. Undoubtedly many of these farmers having become enthusiastic over the possibility of increasing profits from the business by the strike methods of demanding better prices for the product, have neglected to pay any attention to their own particular duty of cutting the cost of production.

The writer, believing that the long time interests of the dairymen, not only in the market milk section, but in the cheese factory and creamery districts of the state would be best served if there were less agitation over increasing the price and more consideration given to cutting the cost, has not been in sympathy with many of the so-called "friends" of the dairyman - the organizers and the agitators. In the recent Chicago milk controversy if the matter had been handled with good psycology and an advertising and educational campaign used as a "barrage" in preparing the consumer for the real facts in the matter, undoubtedly the same price might have been secured, there would have been less villification of the dairymen, the consumer would have consumed at least a normal and probably an increased amount of milk and dairy products, and the dairy industry would be in better shape to with-

stand its competing products.

While there have been a number of investigations of the cost of milk production in other states, it was thought that facts gathered in Wisconsin would be of more value and have more weight with Wisconsin consumers and producers. This investigation was started in three sections of the state: In Shawano county, where the dairy farms are being carved out of the forests and where the milk is sold to local cheese factories; in Sauk county, an established dairy section where the cream was sold and the skim milk used for feeding the live stock; and in Walworth county, a typical market milk section. These investigations were conducted in connection with the local cow testing associations, but because of the necessary changes of testers in the first two associations and the lack of sufficient time to take the inventories the work was finally completed with ten herds in southern Wisconsin.

In securing the data the amounts of feed consumed and the amounts of milk and fat produced by the herd was determined by monthly weights and tests as used in the regularly organized cow testing association. With the cooperation of the tester, an inventory of cattle, buildings, etc. was taken and the data regarding labor, etc. secured by actual time spent in the work and by estimates from these records.

The ten herds had 290 cows in milk during the year, and estimates of feed consumed and milk and fat produced were from 170 of these cows that were in the record for an entire year. Three of the herds consisted of pure bred Holsteins, one of pure bred Brown Swiss, and the remainder were of grade

Holsteins. While it was desired to get typical dairymen of this section, I believe these ten men were a little above the average for the section, because as a rule the better class of dairymen are usually found in cow testing associations.

The average production of the cows in the ten herds was 7765 pounds of milk testing 3.55 percent and containing 275.8 pounds of fat, the herds producing milk at $1.41 per hundred. A pure bred herd of Holsteins led the association with an average production of 10,012 pounds of milk and 355.2 pounds of fat, producing milk at $1.65 per hundred, while the low herd was one of grade Holsteins averaging 5852 pounds of milk containing 211.8 pounds of fat and producing milk at $1.56 per hundred pounds. This gives one indication that high production does not always mean economical production, and that there are other things to think of besides getting the last pound of milk possible from the herd.

Value of Cow

There seems too little appreciation of value in cows. Yet more of our dairymen are now coming to realize that merit is determined not by looks, price, or pedigree, but by the difference between her expense account and the value of her products. The average value of the cows in this investigation was $132.70, the pure bred animals averaging $215.00 and the grades $96.70.

The average depreciation, an item which is often overlooked by the dairymen, was $23.30 for the more valuable cows and $6.43 for the grades, making an average of $11.49 for the

cows in all the herds. While interest rates are directly in proportion to the value of the cow, the depreciation rate is much higher for the more valuable animals, for at the end of the milking period the pure bred cow is often not worth any more for beef than the grade cow, and sometimes not so much. Depreciation was figured by substracting the beef value of the cow from her dairy value and dividing by the number of years of service. The estimates as to the working life of their dairy cows varied from 5 to 10 years, but most thought that 6 years was the average working life of a cow in that section. Those who gave their cows most care and attention estimated the working life to be longer than 6 years, but those who had trouble with abortion, garget, tuberculosis, calving, etc. gave the lower estimates. The investigation shows the necessity of giving due consideration to the greater depreciation on high priced cows, and the effect of reasonably good care and attention in prolonging the usefulness of the cow. This is another example where care and consideration make for increased profits.

The Cost of Bull Service

In most investigations the value of the calf at birth is used to offset the bull service, but in this investigation because of the large number of cows served by one bull, the average cost of bull service was less than half the value of the calf. The major items in the cost of keeping the bull consist of interest on his value, depreciation, and feed cost. The average bull cost was $4.56 per cow, the maximum cost being $11.61 per cow in a herd having a very valuable bull; the

minimum cost being $1.45 where an old bull was used on a large herd.

Depreciation on bull was figured the same as for cows: The difference between value at end of service and present value, divided by the number of years the bull could be used in the herd. The feed cost does not vary much with the different bulls, but the depreciation varies quite closely with the present value, for the high priced bull is not used very much longer than the medium priced bull and does not bring much more at the block. The depreciation charge per cow was greatest on the $1000 bull, it being $8.04, and least on the $85.00 bull - only 47 cents per cow. When a small herd of 12 or 15 cows is charged with the service of a high priced bull, the cost of bull service becomes an important factor in the cost of dairy products, yet in order to maintain or increase production of the herd it is necessary to use good bulls, which usually also means higher priced bulls.

Three of the dairymen usually used their bulls for five years, breeding him to the mature cows and the heifers of the previous bull, and thereafter to the original mature cows, and in some cases breeding back to the daughters. Most of the dairymen used the bull only three years, at the end of which time the bull was sold at the block and a new bull, usually a young animal, purchased. When the bull is used in the herd for only three years and then sold at beef prices, the cost per cow per year is exceedingly heavy, especially if a good bull is used.

The problem, then, lies in getting a good bull, using him on as many cows as possible, and keeping him in service as long as possible. The dairymen that are in cow testing associations have the solution of this problem in their own hands, as shown by the methods used on two of these farms.

Most dairymen realize the necessity of using a good bull, if the production of the herd is to be maintained or increased. One authority, Dr. C. H. Eckles of Missouri, recently stated, "I will say that in a herd where the animals are much the same breeding a heifer calf from one of the best cows in the herd stands some chance but a very small one of being better than a heifer from one of the average cows in the herd provided they are both by the same bull. Unless a sire is used much better than the cows the heifers will have to be culled almost as much as their dams." The member of a cow testing association has an unexcelled opportunity to know what kind of a bull he is using. As with the cow, it is necessary to "test" the bull before his real value is known, and the way to test the bull is to compare, both in type and production, his daughters with their dams. In a cow testing association the yearly records of all the dams and all their daughters can be obtained at the minimum expenditure of money and labor. By a number of dairymen using the bull cooperatively it is possible to secure a bull of extra good breeding, the price of which would be almost prohibitive for any one man. In this investigation one of the dairymen had one-fourth interest in a $1200 bull, one-half interest in a $250 bull, and one-third interest in a

$1200 bull. One of the other members had a half interest in a $250 bull. Thus at the end of the service period the exchange could be made with one of the neighbors and both would get aged bulls of proven ability, and the bull could be used another two years, when the third cooperator would get him through another shift of the three bulls. In the investigation where two dairymen used the one bull cooperatively both seemed pleased with the arrangement. While it is obviously not so handy to use a bull cooperatively, the advantages in securing service from a proven bull and in extending the service period of such a bull, rather than beefing him at the end of two or three years, and the lower cost per cow for good bull service, makes some modification of the cooperative bull association, or cooperative use of bull, a practice to be urged in many sections of Wisconsin. Especially, could this plan be used in upper Wisconsin where the herds are small and the dairymen are starting in the business, for if the right bulls are now used, upper Wisconsin will be a land full of good cattle, whereas if the nondescript bulls are used nondescript cattle will be found.

This plan should in no way be confined to upper Wisconsin, for there is need for good bulls in the market milk section of Wisconsin. In fact in some of the herds investigated, as is the custom in much of the market milk section, the bull and heifer calves are sold for veal and often when the cow becomes dry she is sold and a fresh cow or one soon to freshen is bought. The bull is kept to make the cows freshen,

little consideration being given as to the quality of the offspring. Under such a system of dairying it is impossible to develop profitable herds of high production. Granting that it is possible for the calves to be raised much cheaper in other sections and shipped to these market milk sections, yet it is impossible for the buyer to be assured of the quality of the young cows which he buys. But if they would raise their own best calves they would know the quality of both dam and sire and would be well repaid in getting a bull that would increase the production of the heifers over their dams. Under these conditions, the cooperative use of bulls by three or four dairymen or the exchange of proven bulls would probably be more satisfactory instead of the regularly organized bull association.

Dairy Buildings

Many people do not save any money because they spend that which they might save on dress and the luxuries of life. Likewise, in this investigation some of the dairymen could have made better profits had they put less money into unnecessary and expensive buildings. The average value of the dairy barns and milk houses was $3645, the highest valuation being $5500 and the lowest $2625. The highest cost per cow per year was $14.66, and the lowest cost was $7.12, the average being $9.84. The dairymen having concrete silos and milk houses, while having similar investment costs, had remarkably lower depreciation charges, an item to consider in planning the farm buildings.

The object in having a good barn is to comfortably provide for the stock and to save time and labor in feeding and caring for them, yet in all cases heavy expenditures did not mean that the cows were better housed or that the work was more easily done. Proper arrangement of the barn, rather than expensive construction and equipment, were the great factors in saving labor. The same is true in regard to sanitation. The most expensive barns were not the most sanitary, nor the least expensive were not the least sanitary; the man and the method having much more to do with the cleanliness of the product than did the arrangement of the barn. In fact no reason could be found why good milk could not be as cheaply produced in barns costing less even than did the cheapest barn in this investigation. When the cost simply of sheltering a cow and her feed amounts to $10 per cow per year, consideration should be given to methods of cutting this cost.

Dairy Equipment

The cost of dairy equipment, while not a very large item in the cost of producing milk on the average dairy farm, amounted to $3.01 per cow per year. Milking machines, which were used on most of these farms, were the most expensive items, and with one exception all the dairymen were well pleased with their machines, stating that they would hardly be able to continue in the business without them. The milk scale, while a very small investment,was declared by all to give the most returns. The increased cost of milk cans, pails, etc., and the short time that they are generally used, make these

items of cost much greater than one would expect. Yet, the experience of one of these dairymen shows that even this item may be materially reduced. Most of the dairymen used their cans and pails but one or two years, but this particular dairyman claimed that he had been using the same pails and cans for fifteen years. With the high cost of tin and galvanized iron, it would seem appropriate economy to care for the utensils in such a way that they may not be ruined in a year or so, and to repair them rather than to discard them.

On those farms which did not have milking machines the cost per cow for dairy equipment was a comparatively small item. Those having old machines on which there was considerable repair, such as teat cups, tubing, parts for the engine, etc., found the cost considerable.

Veterinary and Drugs

The cost per cow per year for veterinary services and drugs was not a large item, amounting to $1.31 per cow per year. Yet, in some instances where all veterinary work was done by a veterinarian, where there was contagious abortion and consequently considerable trouble in cleaning cows at calving time, disinfecting the bull, etc., and where testing for tuberculosis was done, this expense ran as high as $7.14 per cow. On most of the farms where the dairyman was his own veterinarian, doing the ordinary small jobs of the veterinarian, and called the doctor only in serious cases or where valuable animals needed attention, the cost for veterinary service and drugs was comparatively small. It would seem reasonable to expect the

dairyman to secure such information and experience so that he could attend to at least the minor veterinary problems,calling the veterinarian only in the case of the more serious difficulties.

Gasoline, Washing Powder, and Incidentals

The expense per cow for gasoline, washing powder, and incidentals was the smallest of all items entering into the cost of milk, it being only 71 cents per cow. Some of the dairymen not having milking machines thought that the incidental expenses were covered in some of the previous items and made no charge under this heading. Observations in two instances were that a somewhat larger expenditure in washing powder would be advantageous.

Insurance and Taxes

Because of the fact that some of the members carried high insurance on their cows, the cost of insurance was a considerable item in the cost of producing milk. The average of $2.05 per cow per year for the ten herds is probably above the average cost of insurance and taxes on the average farm in that section, for it would be very seldom that these items would amount to as much as $6.02 per cow as they did on one farm. All carried insurance on the buildings and half of them carried insurance on the stock. Usually there is much complaint regarding the taxes, but among these ten men it seemed to be a source of pride rather than a burden, as they felt that the more taxes they had to pay the better they would be able to pay them. Nevertheless, an unescapable tax is an item in the

cost of milk production even though it be rather an insignificant one.

Cow Testing Association Fees

An average cost of $1.25 per cow was charged for cow testing association fees, although this charge should properly be increased somewhat, as board and lodging one day a month was furnished and the tester transported to the next place. All the dairymen thought this was a good investment and a proper charge against the cost of producing milk. In fact, this one item, the next to the smallest item listed, was responsible in a large way in reducing the cost of feed per cow and increasing the production per cow, both of which are very important factors in economical production.

In this section where there is the most complaint regarding the cost of producing milk and the price received for it, there is the most difficulty in getting the dairymen to invest in the cow testing association proposition, yet no other investment they could make would be so profitable for them. The cow testing association will enable them to get rid of their unprofitable cows, of which they have a sufficiency, for the method of buying cows rather than raising them necessarily results in many low producers. Likewise the constant danger of introducing abortion and tuberculosis into the herd makes this practice additionally expensive and dangerous. Better methods of feeding and better care and attention to the herd, and the ridding of the herd of the low producers were to a great extent the causes for lower costs and higher production among these

ten men than among the ordinary dairyman in that section. Under the conditions now prevailing in that section,it would appear that membership in a cow testing association is the best investment possible and should be the first step to put the business on such a basis that it may survive.

Losses

Losses of mature cows with tuberculosis and at calving time, and death of calves as a result of contagious abortion and scours were the major causes of loss which averaged $2.85 per cow per year. As in the matter of depreciation, the cost per cow for losses is very much heavier on the herds of high value than on the herds of lower value. It seemed that in those herds where most attention was given to the care of the animals, where animals entering the herd were first quarantined for tuberculosis and abortion, and where any irregularities and sickness were promptly attended to, that the losses were much lower than in those herds where these conditions did not prevail.

Bedding

In many investigations the cost for bedding is charged into the cost of roughage as the bedding usually consists of the uneaten roughage. In this investigation, however, a separate charge was made for bedding because some of the members bought shavings, sawdust, and straw for this purpose alone. Where the cost for bedding could not be definitely ascertained it was estimated at $3.00 per cow per year, making the average cost per cow in the ten herds $3.58.

Man Labor

The amount of labor required on the different herds was determined by keeping an actual account of the amount spent on the herd the day that the tester was at the farm, and if that was an abnormal day allowances were made in estimating time spent on the herd during the month. The charge per hour for labor was determined by dividing the number of hours of service into the wages plus charges for board and lodging for the period.

The average number of hours spent per cow was 140, the greatest number was 224 hours, and the lowest number 102 hours. As we might expect, the pure bred herds received more time and attention than the grade herds, although there seems to be no special reason why it should take more time to feed and care for a pure bred cow than for a grade. To give the same quality of care it would not take more time, but the animal is more valuable and the dairyman spends more time looking after her. The dairymen having the most conveniently arranged barns required the least number of man hours per cow, and the reverse was also true. In the task of cleaning out the barns there was great difference in the amount of time required. Those having cows arranged facing out with driveway so that manure could be loaded directly into the manure spreader had much smaller man hour requirements than did those who used wheelbarrows or manure carriers in cleaning out the barn. When we consider, too, that a much greater saving in the fertilizer constituents in the manure may be saved in this way, the practice commends itself as one of the more efficient methods

in dairy farming, the arguments of litter carrier agents notwithstanding.

While one dairyman might put exactly as many hours per cow into the dairy business as did some other man, it was certainly obvious that he did not get as much done. This appeared particularly true of the hired help, even when paid the same wages. In caring for stock it is not so much the number of hours put in, but what was done in that time which affects profits.

The dairymen who used milking machines and who had a separate house for the hired man were able to get and keep good help, and had no complaints to make regarding the labor problem such as the other dairymen made. In these days of labor shortage the above suggestions might be used to advantage in solving some of the difficulties in these sections. A boy or woman can market the milk as well as the man, and thus release him for the heavier work about the farm. Where the milk is taken to market each morning the labor item is considerable, and it would seem that either the boys or women could do this work during the summer season,or arrangements be made for cooperative delivery, as is the custom in some sections.

On certain of these farms the labor cost is high and the profits small, largely for the reason that the owner is supervisor rather than a worker. On large estates where the volume of business could afford such supervision it would be justified, but an average of 163 acres to the farm will hardly support a non-working supervisor. If he worked he would not only have

been able to save the hired man's wages and board, but also might have better managed the business as a result of his closer contact with the problems.

Horse Labor

In this investigation the horse labor was employed in hauling manure from the barn and in marketing the milk. On some of the farms where they had small trucks or old autos these were used to great advantage in getting milk to the station, for they saved a great deal of time. If other work for the light truck could be found, it could be used profitably; or if the boys, girls, or women could not aid in hauling the milk to town, it would be economy in many cases to hire someone to gather the milk from a number of the dairymen and haul it to the station.

Feed

Feed is by far the greatest item of cost in milk production and the cost of feed per cow determines to a great extent whether the dairy is run at a profit or not. In this investigation the highest feed cost was $89.63 in a herd having an average production of 10,012 pounds of milk, and the lowest feed cost was $37.20 in a herd having an average production of 7,366 pounds of milk. The average cost of feed for all the cows was $62.10, which was 45 percent of the total cost and 56 percent of the net cost of producing milk.

All of the dairymen used silage and clover or alfalfa hay and good grain rations, and as a whole used better than average feeding methods. Since the feed cost is such a large

factor in the cost of production, the feed cost and the cost of production followed each other quite closely. The herd having the lowest feed cost did not have the lowest production per cow but produced milk at the least cost - $1.01 per hundred pounds. The herd having the highest feed cost had the highest production and the highest cost of producing 100 pounds of milk - $1.65. The returns for $1.00 expended for feed were the same for the herd having the highest milk production per cow as they were for the herd having the lowest production per cow - $2.24 in each case. The herd producing milk at the highest cost - $1.65 per hundred - required the most feed units per cow - 7181, and the herd producing milk at the least cost - $1.01 per hundred - required the least feed units per cow - 4215. This but substantiates the belief secured from other investigations that it is not always the highest producing cow that makes the most profit, although as a general rule this seems true as shown by some of the accompanying charts and records. When a certain point is reached, the last few hundred pounds of milk cost too much. The law of increasing and diminishing returns is in force, and if production is forced to the very limit the cost of production line comes nearer to the value of product line, and the profit line becomes a descending arc.

To determine at what point in the cost of production the most profit is made is a very interesting study. We know that so far as feed costs are concerned the zenith of profits is reached at some point above the maintenance requirements and at some point below where cost of production meets value of

products, but we cannot say that it is at 5000 or 8000 pounds of milk or at a feed cost of $50 or $125. This point will have to be determined for the individual cow. Some cows will reach the zenith of profit at a certain feed cost while others will reach it at a different point. The folly of feeding only a maintenance ration is apparent to most dairymen but over-feeding insofar as profit is concerned is not so apparent, although it occurs less seldom. The fallacy most common is in thinking of the herd as a whole and feeding accordingly, rather than considering the herd as a group of individuals that must be fed as individuals according to their ability to make a profit.

Certainly the dairymen will want to conduct his business in such a way that he may secure the greatest profit from his expenditures for labor, feed, etc. Since feed is the major item in the costs of milk production, and the other total costs are fixed and vary little as feed is increased or decreased, it is important for the dairyman to know when he is feeding his cows for maximum profits. The only way for him to determine this is to weigh the feed consumed, and weigh and test the milk produced. Roughage could be weighed once a month, and grain weighed at each feeding, and the milk weighed at each milking, preferably, or weighed and tested once a month. With this information at hand, changes can be made in the ration from week to week,if necessary, and the maximum profits continually secured. Of course it would be necessary to take some additional facts into consideration, such as the periods before and after freshening and physical condition of the cow. Until the

dairyman does keep such records of feed consumption and milk production he has not done his part in the economical production of milk and has no right to complain of the high cost of producing milk.

In this investigation the herds that produced the most milk for $1.00 expended for feed were herds fed largely on roughages. At this time when roughage can be grown on the farm at about the same cost as heretofore, and when grain costs almost twice as much as it did but a year ago, it seems that the maximum roughage ration should be used. The summer silo was strongly favored by the dairymen who had experienced late and early frosts and midsummer drouths, and it was largely because of the summer silo that the herd producing milk at the least cost had such a low feed cost and high milk production. Especially should a maximum roughage ration be used at this time when the grains sometimes used as dairy feeds can be utilized as human food.

Total Costs

The total cost of keeping, feeding a cow, etc. for the year varied from $210.34 per cow to $94.14 with an average for the ten herds of $139.35. Under present conditions the costs of July 1916-17 have probably advanced 75 percent on feeds, 25 percent on labor, and 75 percent on dairy equipment, the other costs remaining about the same. Thus the cost of feed would be $108.70, the total costs amounting to $194.13. Under conditions existing when this investigation was made, feed cost was 45 percent of the total cost of producing milk, but under

the present conditions it would be 56 percent of the total cost, thus showing the increased necessity of attention to possible economies in feeding.

Credits

In the herds where a heavier ration was fed and where the manure was hauled directly to the field, each cow was credited with manure at $20 per year, the remaining herds being credited at $15 per cow per year. Observations on some of these farms, as well as many others in the state, show the possibility of increasing crop yields by better care of manure. A cost accounting system which charges feeds at market price regardless of cost of producing the crop will not show the effects of wasteful handling of manure, nevertheless the amount of feeds purchased in comparison with those raised on the farm will in the future years be a good indication of how the manure has been handled. In many cases the credit of $15 per cow is not a proper credit for the cow, although this is of course through no fault of the cow.

The pure bred calves were credited at $25 at birth and the grade calves at $5, it being assumed that each cow would produce a living calf once yearly. Calf scours, abortion, and difficulty in breeding will cut this rate considerably. If bulls of proven value were used only on the high producing cows, the value of the calf would be materially increased, especially so if the heifer calf is kept to replace the discarded cows instead of being vealed, a practice too common in this section.

In this investigation if we estimate the skimmilk at 80 percent of the whole milk and at 75 cents per hundred, the value of the skimmilk, the manure, and the calf will offset all the other charges excepting that of feed. In the creamery section of the state where the costs other than feed are not so high as they are in the market milk section, and where value of the calf at birth would be somewhat higher than in this section, it would seem that the credits above mentioned would fairly offset the costs other than feed.

Profit

Profit, which is the difference between the net cost and value of milk, ranged from $66.26 per cow in the herd producing milk at the least cost per hundred to $21.35 per cow in a herd producing milk at next to the highest cost. The average price received for milk testing 3.5 percent was $1.95 per hundred and 3 cents a point was paid for the variation either above or below this standard. Under such conditions the dairymen who produced milk testing over 3.5 percent were working at a disadvantage, for it costs more to produce the high testing milk for which they received only 30 cents per pound for all fat more than 3.5 pounds in a hundred, while in the milk testing 3.5 percent every pound of fat was sold for 55 cents per pound. Under such a system of payment there is no incentive to produce high testing milk, in fact, there is a strong temptation presented to skim or water it, for the lower testing the milk is, the greater the returns per pound of fat.

Net Cost of 100 Pounds of Milk

The average net cost per hundred pounds of milk varied from $1.65 in the herd with the highest average production - 10,012 pounds - to $1.01 in the herd averaging 7,366 pounds, the average for all of the herds being $1.41 for cows averaging 7767 pounds. Taking into consideration the advances in feed, labor, and dairy equipment as previously noted, and considering the other costs to be the same as in July 1916 to 1917 the total cost of producing 7767 pounds of milk would be $194.13 per cow. The total cost per hundred pounds of milk would be $2.50 and the net cost would be $2.12. Under these conditions feed would constitute 56 percent of the total cost and 66 percent of the net cost of producing 100 pounds of milk.

Observations

As a result of this study and the observation of dairy conditions in other sections, there seems to be no reason to become unduly alarmed over the dairy farming situation, and it would appear that the market milk producer has even less cause to worry than has the cream producer. If the price of market milk or other dairy products can be increased through collective bargaining, proper advertising and education, greater profit can be secured on many farms by attention to some of the factors aforementioned. Until attention is given to these factors, the increase in the prices of feed, labor, and dairy equipment (in no case the fault of the consumer) will not in themselves justify increased prices for dairy products. If feed has become by 10 percent a greater factor in the cost of producing

milk, more attention must be given to cooperative feed buying, the farm must be organized to produce feed most economically, and better methods adopted for feeding the individual cow for profit. If the cost of labor has advanced, labor saving machines and methods must be used and arrangements made to utilize most efficiently the labor that is available. New conditions require new methods. The dairyman is his own savior, and he will live more efficiently and happily if he remembers that God helps those who help themselves.

Production, Feed Cost, Feed Units in Linn Association

	Milk	Fat	Feed Cost	Feed Units	Units # fat
F. Turner	10,012	355.2	$89.63	7181	20.2
A.D.Cornue	9,267	328.7	77.10	6489	19.7
A.P.Kaye	9,301	317.9	58.69	5427	17.0
I.Kimball	7,574	300.3	54.54	5283	17.6
H.M.Hatch	7,610	281.9	59.63	5371	19.0
G. Stowall	7,638	262.3	68.73	4923	18.8
A.E.Cornue	7,366	261.6	37.20	4215	16.2
Ledger Bros.	7,313	258.6	54.80	5238	20.2
D.M.Weter	7,203	239.7	74.64	5753	24.0
M.A.Robinson	5,852	211.8	52.63	5228	24.7
Average	7,767	275.8	62.10	5418	19.6

As might be expected, the high producing cows required more feed units per cow, yet as a rule required less feed units per pound of fat than did the lower producers. The exceptions to this rule were the herds which, so far as economical production is concerned, were not fed economically.

The herd with the highest production required 7181 feed units per cow and 20.2 feed units for one pound of fat. The herd of lowest production required 5228 feed units per cow and 24.7 feed units for one pound of fat.

Average number of days in milk -327

COST OF MILK PRODUCTION.

____ Cow Testing Association. Date ____

Operator ____ P. O. Address ____

Landlord ____ Location of Farm ____

Distance from milk market ____ % Income from dairy ____

How market products ____

Practice all-year dairying ____ Veal or raise heifer calves ____

Breed of bull ____, pure bred or registered ____

Breed of cows ____ No. pure bred ____ No. grade ____ No. common ____

Grow crops for cows ____ What cash crop ____

Acres owned by operator ____

Acres share rented ____

Acres cash rented ____

Total Farm Acres ____

Fall pasture ____

Pasture in rotation ____

Swamp pastured ____

Woods pastured ____

Woods not pastured ____

Permanent pasture not tillable ____

Permanent pasture tillable ____

Acres in roads, waste, etc. ____

	1916			1917			Sold			Purchased		
	No.	Val.	Tot.	No.	Val.	Tot.	No.	Val.	Tot.	No.	Val	Tot.
Cows												
Heifers												
Calves												
Bulls												
Steers												
Stock												
Died												

Estimated life of dairy cows ____

No. of years use bull ____

	Original Cost	Estimated Life.	Chg. to Dairy	Deprecia- tion.	Total
Dairy Barn					
Silo					
Milk House					
Ice House					
Cans					
Pails					
Cooler					
Milking Machine					
Scales					
Separator					

Veterinary, Drugs, Incidentals ____________________
Breeding Fees Paid ____________ Received ____________
Gasoline ________ Washing Powder ____________
Insurance ____________

Pasture Season	No. Cows per month	Milking	Care	Feeding	Care Equip	Mkt'g	Total
Men							
Women							
Boys							
Horse							

Winter Season							
Men							
Women							
Boys							
Horse							

Value of Labor ____________
Grain raised, value ____________ Total ____________
Purchased ____________
Roughage, hay ________ Silage ________
Summer silage used ____________
Bedding ____________

Pasture
No. Stock ____________
Average ____________
Value ____________
Affected by drouth ____________
No. stock rented Paid ____________ Received ____________

Time saved by machine ____________ No. cows per man ________
Kind of machine ________ No. of units ____________
Power used for other purposes ____________
Repairs ____________
Separate strippers ____________ Any bad effects ________
Has it affected production ____________
Would you cut cows if no machine ____________
Disadvantages ____________

Milk, whole ____________ @ ________ Value ____________
Skim milk ____________ @ ________ Value ____________
Sale of stock ____________ @ ________ Value ____________
Manure ____________ Hides ____________

Feed Costs in Linn Investigation

Silage	$3.92	R. K. D.	$38.15
Corn Fodder	2.00	Gr. Oats	30.00
Straw	1.00	Hominy	30.00
Alfalfa	16.65	Bran	22.80
Clover	12.25	Oil Meal	38.00
Mixed Hay	12.50	Corn Meal	31.50
Timothy	12.00	Cotton S. Meal	39.20
Gluten Feed	33.50	Ajax Flakes	27.00
Int. S. Feed	28.00	Climax	33.00
Dr. Br. Grains	30.72	Barley Sprouts	7.50

Pasture at $1.25 per month.

Estimates on Feed Requirements

	Story	Hoover	Pearson	Anderson	Peck	Cooper	Monticello	Waukesha	Linn
Milk	5328			7157	5540	5240	7334	5344	7767
Silage	109	102.6	188	108	73	135	69	130	106
Hay	66	45.3	50	46	71	36	26	47	24
Roughage		11.5					3.3		14
Grain	23	33.5	44	32	19	31	9.5	24	22
Pasture, days	13¢			17¢	3	3.7	2.4	3	1.4
Labor, hours	3	2.9	2.4			4.1			1.8
Other Costs	20¢					63¢			70¢

Effect of Weight on Production

In noting the records of cows in herds visited, it seemed that the high producing cows were usually the larger and heavier cows of the breeds. To get some more information on the subject an investigation was made in the All-Guernsey association in Waukesha county. The cows were pure bred and grade Guernseys. While it was not possible to weigh the cows, estimates of their weights were made by the Tester. In summarizing the records cows weighing over 1000 pounds were classed as heavy cows and those weighing 1000 pounds or less were classed as light cows. Following is a summary of the results showing that the heavy cows produced more milk, more fat, and cost more to feed, but made more profit and returned more for each $1.00 expended for feed:

No.Cows	Av.Weight	Fat	Val.of Prod.	Feed	Profit	For $1.00
100	1115#	286	$187.33	$73.56	$113.77	$2.55
62	955#	266	$171.88	$66.49	$105.39	$2.51

Effect of Age on Production
Waukesha, Stanley, and River Falls associations

No.Cows	Breed	Age	Av.Milk	Av.Fat	% Fat	% of Mature	
						Milk	Fat
83	Hol.	2	6078	228	3.75	73%	76%
65	Hol.	3	6594	245	3.71	79%	82%
50	Hol.	4	8080	280	3.47	97%	93%
140	Hol.	4+	8313	300	3.60		
37	Guer.	2	4829	244	5.05	81%	86%
32	Guer.	3	5351	272	5.08	89%	96%
27	Guer.	4	5590	279	4.99	94%	98%
119	Guer.	4+	5978	283	4.73		

While the number of records studied (553) is not large enough to make very convincing data, the indications are that the mature cows do not produce milk having a higher percentage of butter fat than do the younger cows. It also shows that the Guernsey heifers reach their mature production earlier than the Holsteins.

Pure Bred vs. Grade Cows

Many questions are asked regarding the production of the pure bred cows in comparison with the grade cows of the same breed, and to get some definite information on the subject the records of 1222 Holsteins and 864 Guernseys were summarized with the following results:

353	Pure Bred Holsteins average	7750# milk	264# fat	3.41%
869	Grade Holsteins average	6811# milk	247# fat	3.56%
1222		-939	-17	
74	Pure Bred Guernseys average	5301# milk	267# fat	5.03%
790	Grade Guernseys average	5636# milk	253# fat	4.49%
864		+335	-14	

As might be expected, thepure bred Holstein produces more milk than does the grade holstein, but the milk has a lower percentage of fat in it. This is due to the fact that the pure bred Holstein produces more milk than a cow of any other breed and her milk contains the lowest percentage of fat. Thus, if pure Holstein blood is crossed with native blood or that from any other breed, we may expect a lower milk production and a higher fat test.

The grade Guernsey produces more milk than the pure bred Guernsey due to the fact that the grade blood is a result of the mixing of pure bred Guernsey blood with breeds giving a larger flow of milk, such as Holstein, Ayrshire, and possibly Shorthorn. The percentage of fat in the grade Guernsey milk is lower than that of the pure bred. This is accounted for by the mixing of some breed other than the Jersey with the Guernsey.

Monthly Estimates vs. Daily Weights

Some dairymen question the accuracy of the method used in cow testing associations of estimating the amount of milk produced, and this investigation was for the purpose of comparing the cow testing association method with that of weighing the milk night and morning each day in the month. The cow testing association method consists of taking the weight of the milk one day each month and multiplying it by the number of days in the testing period. If the cow has been in milk a full month the number of days in the calendar month is used, but if she freshens or is dried off during that period the actual number of days in milk is used.

In the All-Guernsey association in Waukesha county the actual daily weights were added to determine monthly production. At the same time, however, the tester entered in the herd record books the weight of the milk of each cow the day that he was at the farm each month. Thus by multiplying the weight of the milk by the number of days in the testing period and summarizing them the comparisons were made.

The usual contention is that estimates made once a month always result in a larger production than the daily milk weighings. However, the investigation showed that the estimates were sometimes higher and sometimes lower than the actual production, the summary of the 251 cows showing the estimates to be 9.7 pounds of milk per cow per year lower than the actual production. If care is taken in getting the number of days in milk at the time when the cow freshens and is dried up, and consideration given to any abnormal condition of the cow at the

time the weight is taken each month, the cow testing association method is sufficiently accurate for all practical purposes. The accuracy of the method is also shown in a study of records in the Minnesota Station and reported in Circular 179 U. S. Department of Agriculture.

While daily milk weights are of great advantage to the dairymen in enabling him to give his herd more care and attention and to feed it more economically, the greater accuracy of the system would not justify him in adding the milk sheets each month to determine monthly or yearly production.

No. Cows	Actual Weights	Estimated Weights	Variations	
			Herd	Cow
14	100,014	94,469	-5545	-396
8	42,698	43,690	+ 992	+ 24
7	29,068	29,758	+ 702	+100
2	13,056	12,666	- 390	-195
8	41,053	41,367	+ 314	+ 39
15	93,945	95,933	+1988	+133
15	89,266	90,381	+1115	+ 74
12	70,341	70,083	- 298	- 25
8	35,874	36,086	+ 212	+ 27
8	43,756	43,225	- 257	- 32
12	74,061	68,733	-5328	-444
14	67,778	65,119	-2659	-190
13	77,098	78,441	+1393	+107
10	74,178	72,569	-1609	-161
20	110,611	116,672	+6061	+303
13	72,809	73,425	+ 616	+ 47
17	107,816	105,675	-2141	-126
9	51,002	52,261	+1259	+140
15	75,431	74,063	-1368	- 41
18	97,324	99,899	+2575	+143
13	67,426	68,658	+1232	+ 95
251	1,434,605	1,432,173	-2432	- 9.7

Feed Units Consumed in Guernsey Herds in Waukesha County

Herd	No.Cows	Milk	Fat	Units per cow	Units # Fat
W.Hardiman	14	7144	322	5868	18.2
A.J.Basse	10	7418	314	6913	22.0
F.E.Fox	2	6528	301	4707	15.6
S.C.Hooper	15	6263	294	5073	17.2
O. Craig	15	5951	291	6095	20.9
C. Spaulding	8	5087	286	5899	20.6
L. Wendt	9	5667	273	5173	18.9
E. Williams	12	5862	270	5052	18.7
C. Connell	14	4841	253	5401	21.3
Nash. House	20	5531	252	4118	16.3
J.D.Mitchell	15	5029	250	5402	21.6
C. Kunney	8	4484	214	4656	21.7
W. Schwab	8	5131	203	4809	23.6
W. Freehoff	9	4153	192	4088	21.3
E. Roberts	13	5931	171	5134	30.0
Average	11.3	5344	268	5251	19.6

Economy of High Producing Cows

The Monticello association of 458 Holstein cows in 22 herds, all of which are kept under somewhat similar conditions, make an interesting study of the relation of production to economy of production. These 458 cows averaged 7334 pounds of milk containing 245.4 pounds of fat. It required 4211 feed units for each cow and 17.2 feed units to produce one pound of fat.

The three lowest producing herds contained 63 cows which averaged 5444 pounds of milk containing 176 pounds of fat. Each cow required 4188 feed units per year and produced one pound of fat for each 24 feed units consumed, and 130 pounds of milk for each 100 feed units consumed.

The three highest producing herds contained 68 cows which averaged 10,209 pounds of milk containing 339 pounds of fat. Each cow required 4776 feed units per year, and produced one pound of fat for each 14 feed units consumed, and 214 pounds of milk for each 100 feed units consumed.

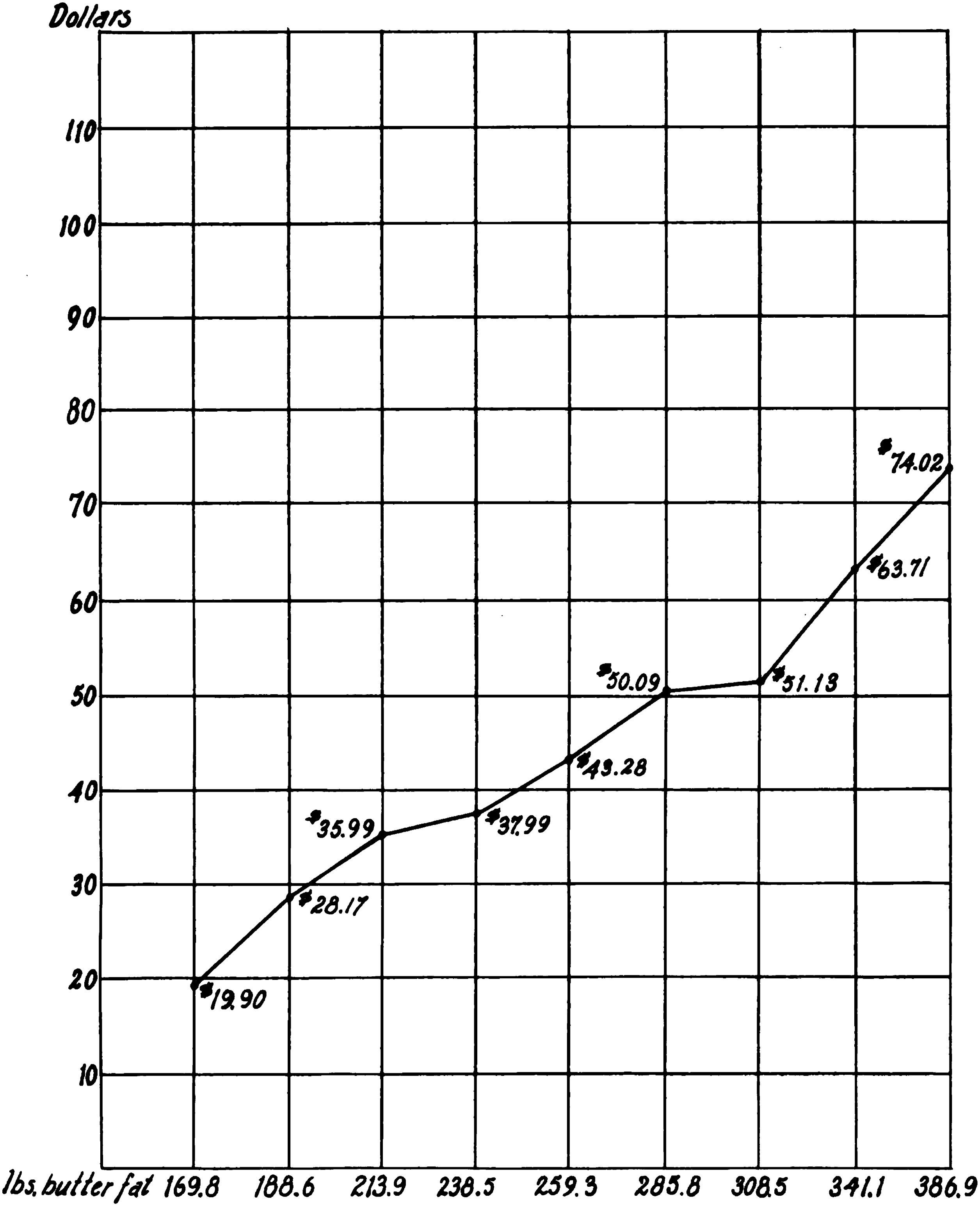
The average cow in the high producing group required 14 percent more feed units but produced 88 percent more milk and 92 percent more fat than the average cow in the low group. Since these cows were fed practically as much as the cows in the high group, the results would indicate that these low producing cows were less efficient producers.

	No.Cows	Val.Products	Feed Cost	Profit	For $1 Feed
High Herds	68	$267.88	$75.72	$192.16	$3.53
Low Herds	63	$125.01	56.22	68.79	2.22
			$19.50	$123.37	

While the cost of feed was $19.50 more per cow in the high herds, the income over feed was $123.37 more per cow than in the low herds.

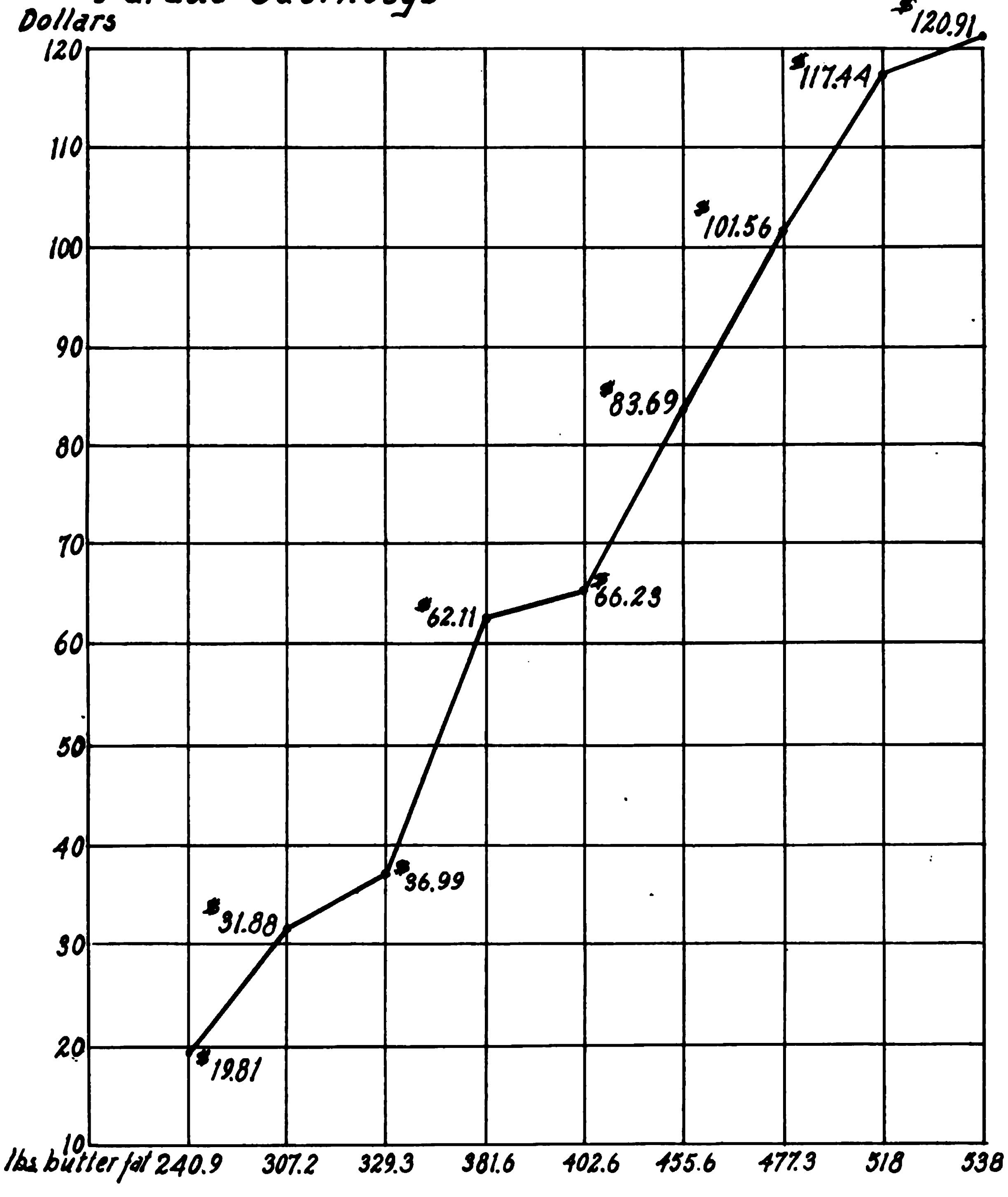
RELATION OF PRODUCTION TO INCOME OVER FEED

365 Yearly Records



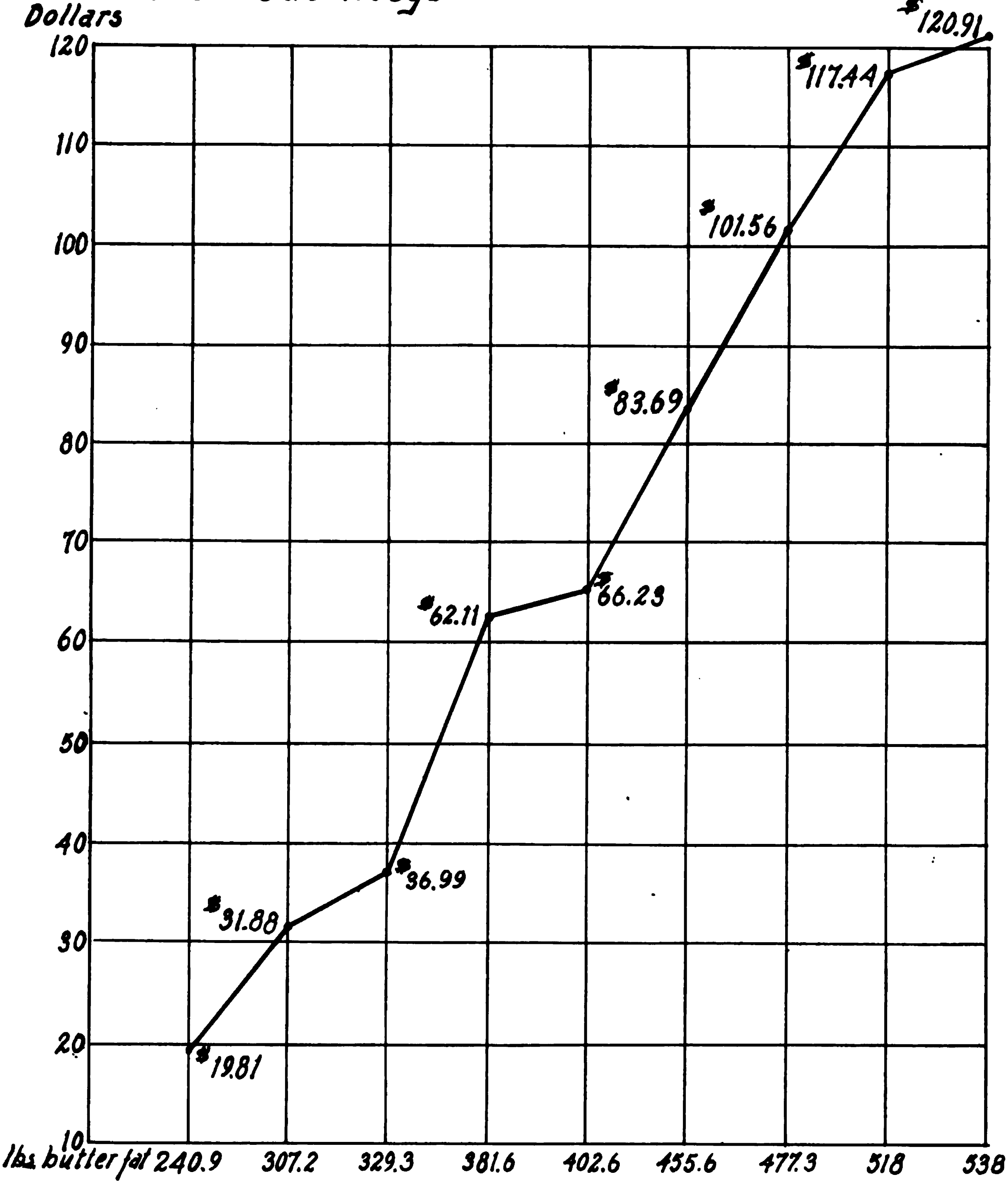
RELATION OF PRODUCTION TO INCOME OVER FEED

9 Grade Guernseys

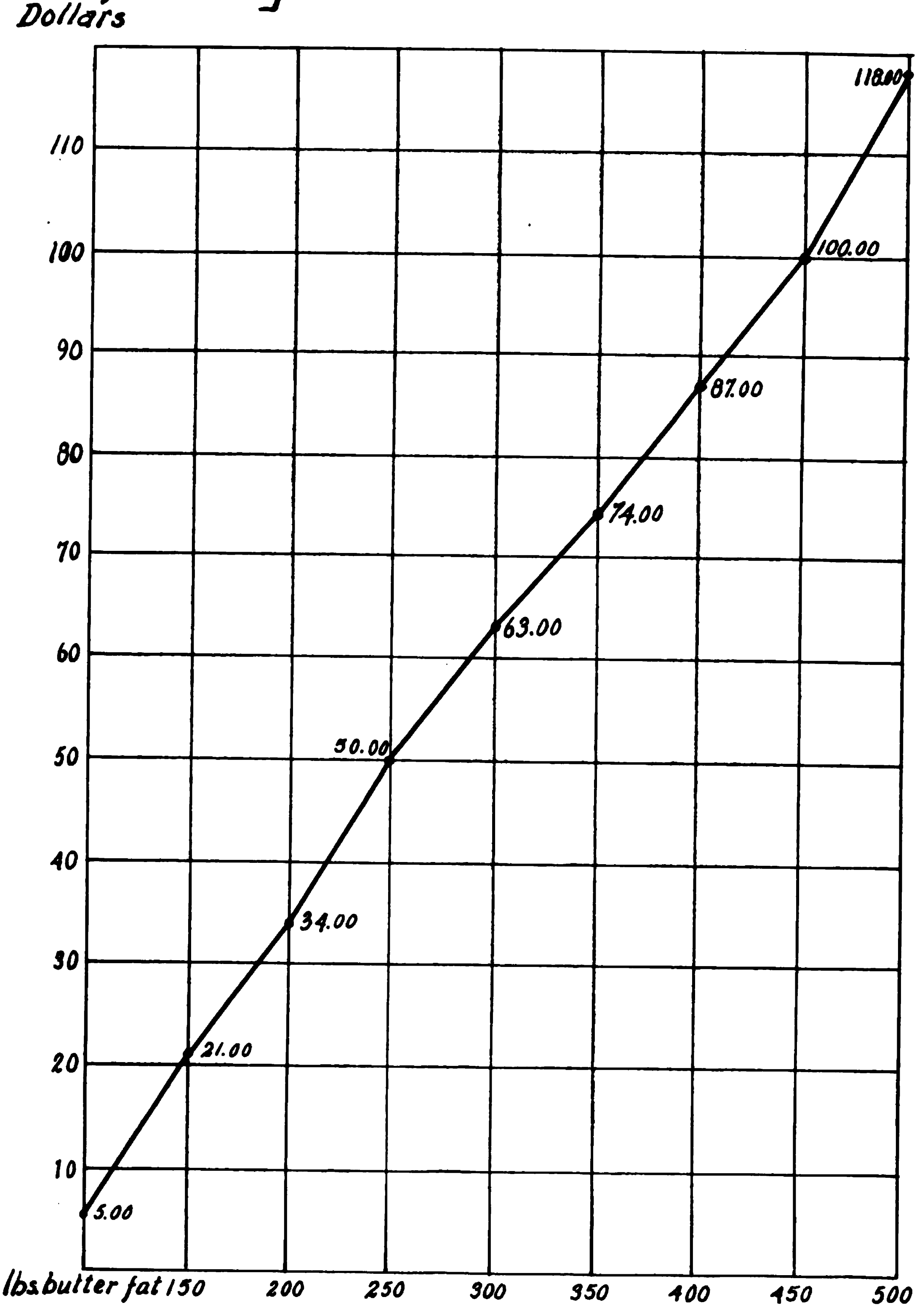


RELATION OF PRODUCTION TO INCOME OVER FEED

9 Grade Guernseys

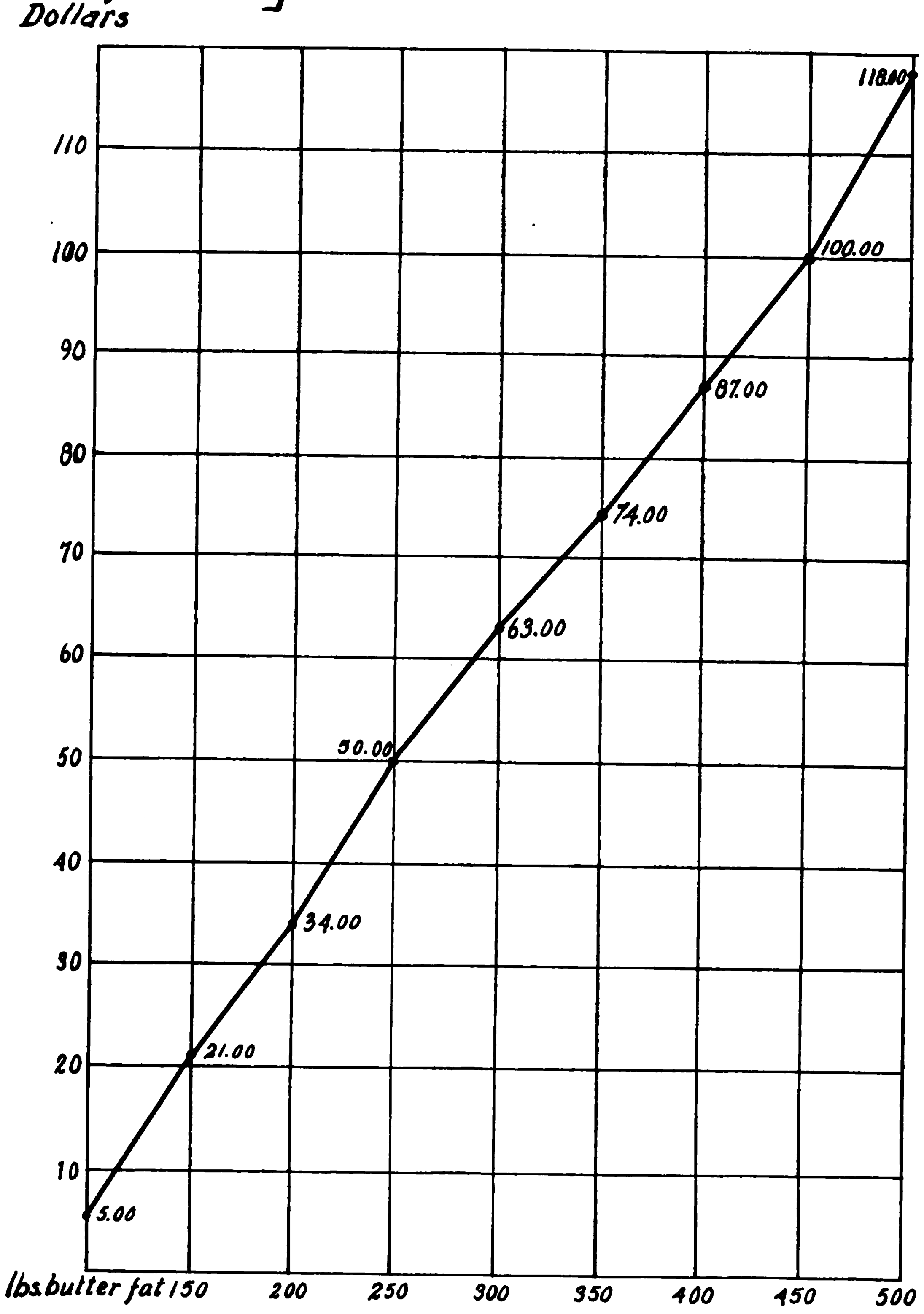


RELATION OF PRODUCTION TO INCOME OVER FEED
5,564 Yearly Records

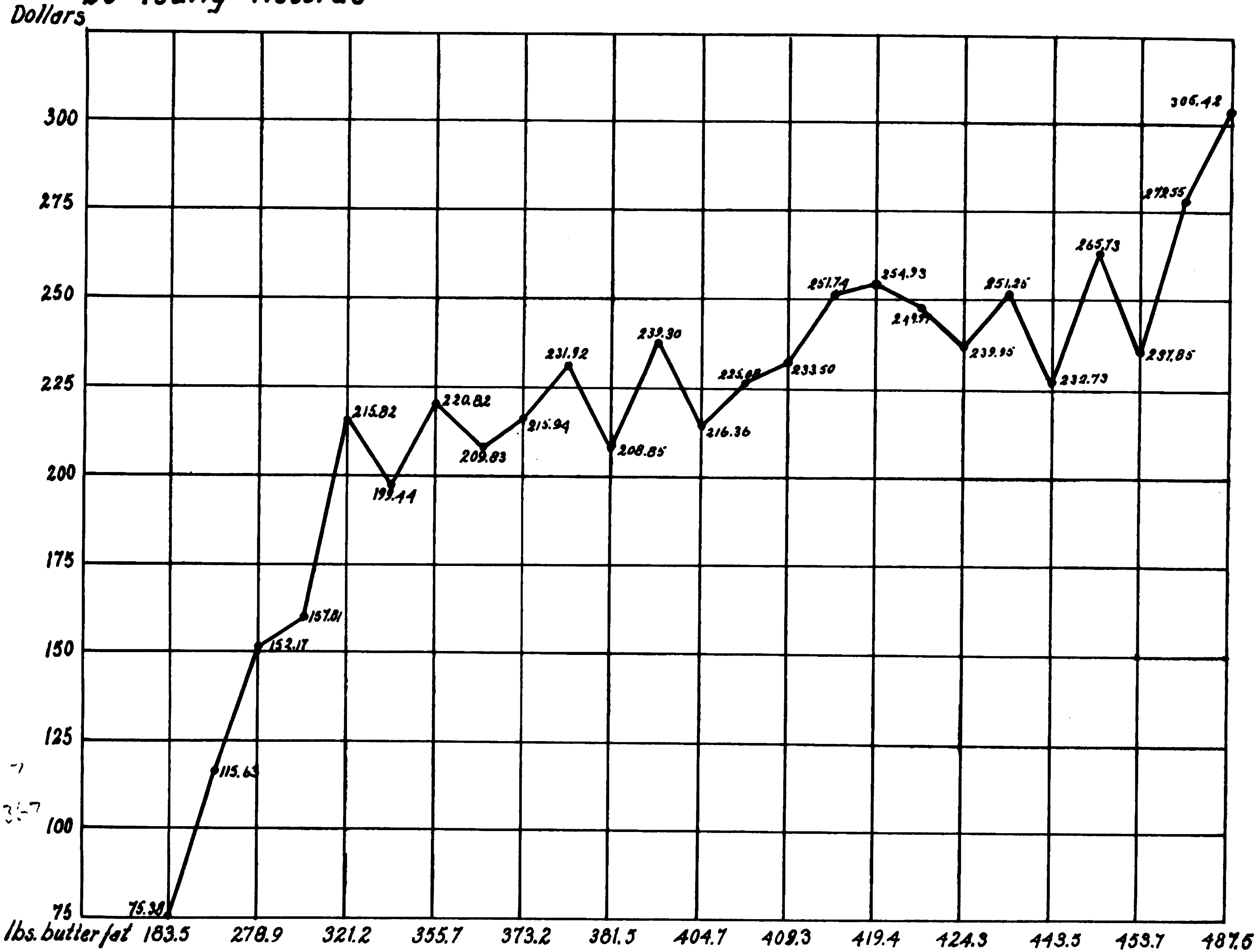


RELATION OF PRODUCTION TO INCOME OVER FEED

5,564 Yearly Records

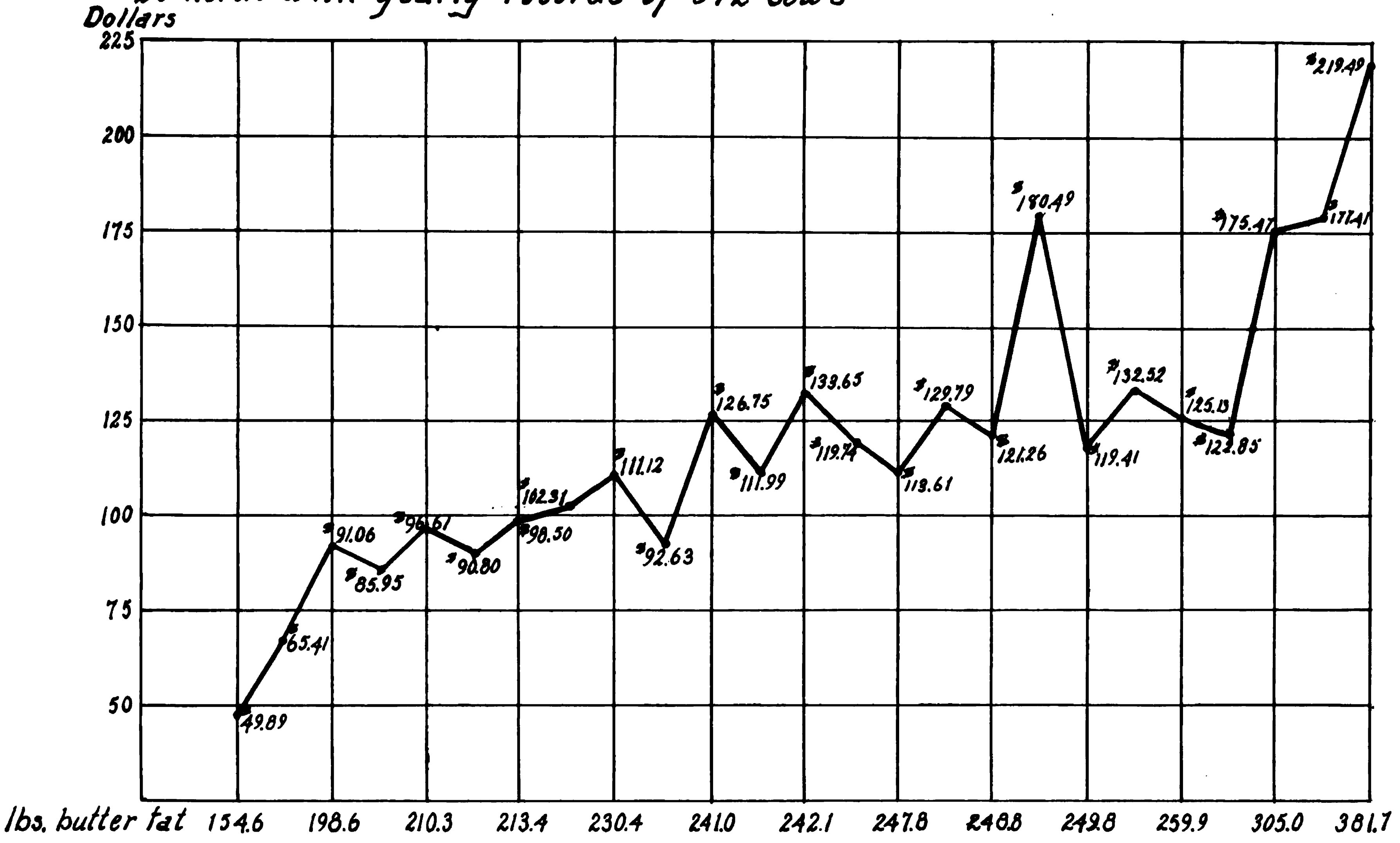


RELATION OF PRODUCTION TO INCOME OVER FEED
25 Yearly Records

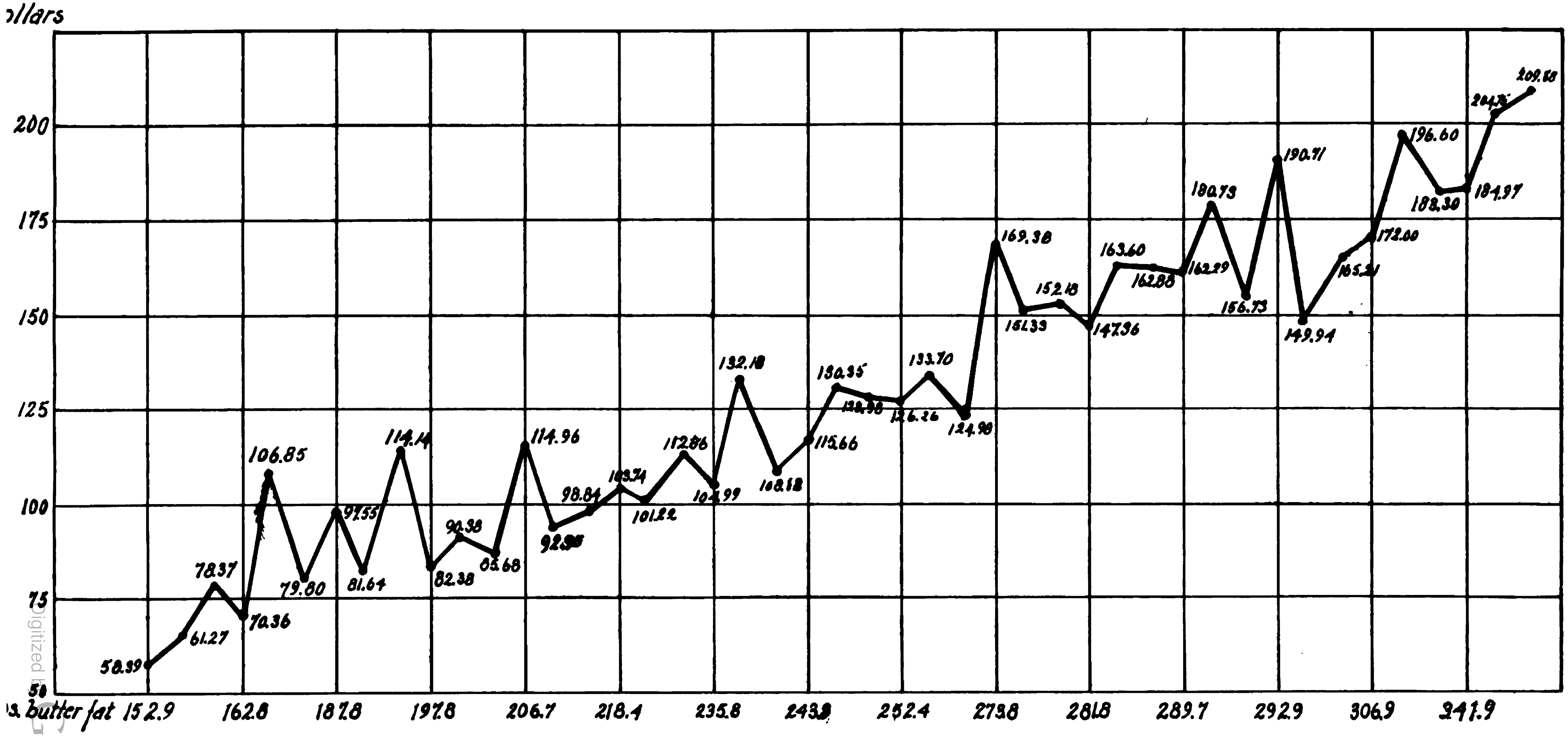


RELATION OF PRODUCTION TO INCOME OVER FEED

25 herds with yearly records of 572 cows



RELATION OF PRODUCTION TO INCOME OVER FEED
45 Yearly Records



Breeds of Cattle in Wisconsin Cow Testing Associations

To determine the number of cattle in the various breeds that are in Wisconsin cow testing associations an investigation was made in 77 associations with the following results:

Pure Bred Holsteins	2,967
Grade Holsteins	15,734
Pure Bred Guernseys	938
Grade Guernseys	5,938
Pure Bred Jerseys	667
Grade Jerseys	1,757
Pure Bred Ayrshires	65
Grade Ayrshires	142
Pure Bred Shorthorns	193
Grade Shorthorns	1,721
Pure Bred Red Polls	64
Grade Red Poll	457
Grade Brown Swiss	205
Others	6,860

Out of the 37,772 cows 11 percent or 4894 are pure bred and 69 percent or 25,954 are grade.

Milking Machine Investigation

On account of the shortage of labor considerable interest has been aroused in milking machines. An investigation into their use in Wisconsin shows that 230 dairymen out of the 1,861 who were investigated are now using the milking machine. Thirteen dairymen have had the machines on trial but have taken them out. Nine of the 230 would prefer hand milking if good help could be secured at a reasonable figure. The reasons for discarding these 13 machines are interesting: One member says he gets no service from the company and that the repairs cost too much; another discarded his because he did not like to strip after the machine. Four others thought they were at fault rather than the machine. One member discontinued use of the machine because he and his two boys could milk faster by hand. Another after using the machine thirty days says, "It's no good."

Out of the 243 dairymen who have machines, 230 enthusiastically endorse them with such statements as these: "I would give up dairying if I had to go without my machine." "If I had to be without a machine, I would not keep any cows." "Ten of my members have machines and several more will be installed. They say they can do better milking in less time." "All members using machines report satisfaction." "There has been no shrinkage in the milk flow since the machine has been in use." "Remarkable satisfaction in every way except incompetent labor to operate machines." "Good satisfaction throughout. Service from company good."

	F. W.Weter :	M.A.Robinson:	Average
Cows			
No.with records	19	28	17
No. in milk			
Pre			
Pre			
Va ***			
In **			
De			
B *			
V			
I			
I			
P			
o			
o			

	: Erf	:
Date	1918	1916
No. of herds		
Average size	20	
Value	.00	
Estimated life	ears	
Milk production	500	
Fat production	193	
Percent fat	3.5	
Feed Cost		107.73
Tax & Insurance	.20	
Depreciation	.45	
Interest	.20	
Death	.44	
Sire	.00	
Man labor		233 hrs- 42.03
Horse labor		30 hrs- 4.50
Buildings cost	for herd	
Equipment cost	for herd	
Bedding	.50	
Cow Testing		
Drugs, Incidentals	.05	
		Other costs 75.45
Overhead & Supervi	.56	
Total Cost		229.71
Manure	.00	19.00
Calf	.00	8.00
Net Cost		202.71
Cost per 100 pound		5000# 4.05 7000# 2.89

Approved Geo. C. Humphrey

Date June 3, 1918.

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